Remarks/Arguments

This is a complete response to the Office Action mailed on February 22nd, 2006 (Office Action) in which claims 1-15 were rejected under 102(e) and 103(a). Claim 15 has been canceled; new claims 16-18 have been added; and claims 1-14 and 16-18 are pending. Reconsideration of the subject application in light of the above amendments and following remarks is respectfully requested.

In the specification, paragraphs [0009] and [0014] have been amended to correct minor editorial problems. The term "flexible substrate" has been replaced with "flexible membrane" in accordance with paragraph [0014].

Claims 1-4 and 6-14 have been amended to correct possible ambiguities and to add further limitations. Claim 15 has been canceled. New claims 16-18 have been added.

Regarding amended claim 1, support for the "means for" clauses being replaced by "a pressure sensor disposed to determine if any of said plurality of tactile elements have been depressed," and "a feedback device disposed to convey tactile feedback information" is found on pg. 4, ¶ 11 and FIG. 2 of the specification; and the addition of a flexible membrane limitation finds support on pg. 6, ¶ 14.

Claim 1. A tactile user interface device, comprising:
a substrate;
a plurality of tactile elements disposed on said substrate wherein each of said plurality of tactile elements correspond to at least a fraction of a pixel ~~a pixel, a fraction of a pixel, or a group of pixels~~ on a video display and wherein each of said plurality of tactile elements comprises:
a pressure sensor disposed to indicate if any of said plurality of tactile elements have been depressed; and
a feedback device disposed to convey tactile feedback information; and
~~means for sensing pressure from a user's finger to determine if the user has depressed any of said plurality of tactile elements; and~~
~~means for conveying tactile feedback information to said user.~~
a flexible membrane disposed on said plurality of tactile elements.

Regarding amended claim 2, "means for sensing pressure" has been replaced with "pressure sensor" to reflect the changes in claim 1.

Claim 2. The tactile user interface device of claim 1 wherein each of said pressure sensors is disposed to provide ~~means for sensing pressure from a user's finger comprises a device that provides~~ an electrical signal when ~~said~~ pressure from a user's finger exceeds a set pressure threshold.

Regarding amended claim 3, the limitation of "mechanical" has been added to "switch," which finds support on page 4, ¶ 11. The "pressure sensors" were added to reflect changes in amended claim 2.

Claim 3. The tactile user interface device of claim 2 wherein each of said pressure sensors ~~device that provides an electrical signal when said pressure from user's finger exceeds a set pressure threshold~~ is a mechanical switch.

Regarding amended claim 4, the "pressure sensors" were added to reflect changes in amended claim 2.

Claim 4. The tactile user interface device of claim 2 wherein each of said pressure sensors ~~device that provides an electrical signal when said pressure from user's finger exceeds a set pressure threshold~~ is a piezoelectric sensor.

Regarding amended claim 6, the "means for" language was replaced with "feedback devices" to reflect changes in amended claim 1.

Claim 6. The tactile user interface device of claim 1 wherein each of said feedback devices ~~means for conveying tactile feedback information to said user~~ comprises at least one microelectromechanical device, wherein said at least one microelectromechanical device has at least two mechanical states.

Regarding amended claim 7, support for the "means for" clauses being replaced by "a pressure sensor disposed to determine if any of said plurality of tactile elements have been depressed," and "a feedback device disposed to convey tactile feedback information" is found on pg. 4, ¶ 11 and FIG. 2 of the specification. The addition of a flexible membrane limitation finds support on pg. 6, ¶ 14.

Claim 7. A tactile user interface device, comprising:
a planar substrate;
a plurality of pins disposed on said planar substrate wherein each of said plurality of pins correspond to a pixel, a fraction of a pixel, or a group of pixels on a video display and wherein each of said plurality of pins comprises:
a pressure sensor disposed to determine if any of said plurality of pins have been depressed; and
a feedback device disposed to convey tactile feedback information; and
~~means for sensing pressure from a user's finger to determine if the user has depressed any of said plurality of pins; and~~
~~means for conveying tactile feedback information to said user.~~
a flexible membrane disposed on said plurality of pins.

Regarding amended claim 8, the "means for" language was replaced with the "pressure sensor" language in order to be consistent with amended claim 7.

Claim 8. The tactile user interface device of claim 7 wherein each of said pressure sensors is disposed to provide ~~means for sensing pressure from a user's finger comprises a device that provides~~ an electrical signal when ~~said~~ pressure from a user's finger exceeds a set pressure threshold.

Regarding amended claim 9, the limitation of "mechanical" has been added to "switch," which finds support on page 4, ¶ 11. The "pressure sensors" were added to reflect changes in amended claim 8.

Claim 9. The tactile user interface device of claim 8 wherein each of said pressure sensors ~~device that provides an electrical signal when said pressure from user's finger exceeds a set pressure threshold~~ is a mechanical switch.

Regarding amended claim 10, "each of said pressure sensors" replaced "device that provides an electrical signal" in order to make the claim language consistent with amended claim 8.

Claim 10. The tactile user interface device of claim 8 wherein each of said pressure sensors ~~device that provides an electrical signal when said pressure from user's finger exceeds a set pressure threshold~~ is a piezoelectric sensor.

Regarding amended claim 11, the "means for" language has been replaced with "each of said feedback sensors" in order to make the claim language consistent with amended claim 7.

Claim 11. The tactile user interface device of claim 7 wherein each of said feedback devices is disposed to position ~~means for conveying tactile feedback information to said user comprises a device for positioning~~ said plurality of pins to a plurality of positions.

Regarding amended claim 12, the "device for positioning said pins to a plurality of positions" has been replaced with "each of said feedback sensors" in order to make the claim language consistent with amended claim 11.

Claim 12. The tactile user interface device of claim 11 wherein each of said feedback devices ~~device for positioning said pins to a plurality of positions~~ is a piezoelectric device.

Regarding amended claim 13, the "device for positioning said pins to a plurality of positions" has been replaced with "each of said feedback sensors" in order to make the claim language consistent with amended claim 11.

Claim 13. The tactile user interface device of claim 11 wherein each of said feedback devices ~~device for positioning said pins to a plurality of positions~~ is an electromagnet.

Regarding amended claim 14, the addition of the step of "disposing a flexible membrane on said plurality of tactile elements" finds support on pg. 6, ¶ 14. The step of disposing a plurality of microelectromechanical devices (each corresponding to one tactile element) disposed to convey tactile feedback information finds support on pg. 6, ¶ 14. Support for replacing the means for sensing limitation with "a pressure sensor disposed to determine if any of said plurality of tactile elements have been depressed" is found on pg. 4, ¶ 11 and FIG. 2 of the specification.

Claim 14. A method for fabricating a tactile user interface device, comprising the steps of:
fabricating a substrate;
disposing a plurality of tactile elements on said substrate wherein each of said tactile elements comprises[[:]] a pressure sensor disposed to determine if any of said plurality of tactile elements have been depressed;
disposing a flexible membrane on said plurality of tactile elements; and
disposing on said flexible membrane a plurality of microelectromechanical devices disposed to convey tactile feedback information, wherein each of said microelectromechanical devices corresponds to one of said tactile elements.
~~means for sensing pressure from a user's finger; and~~
~~means for conveying tactile feedback information to said user.~~

Regarding new claim 16, the limitation of the substrate of claim 1 containing at least a portion of any control circuitry required for said tactile user interface device finds support on pg. 4, ¶ 11.

Regarding new claim 17, the limitation of the substrate of claim 1containing any required control circuitry and any associated circuitry required for said tactile user interface device finds support on pg. 4, ¶ 11.

Regarding new claim 18, the further limitation that each of said feedback devices of claim 6 is disposed on said flexible membrane finds support on pg. 6, ¶ 14.

35 USC § 102(e) Rejection

Claims 1 and 7 stand rejected under 35 U.S.C. 102(e) as being anticipated by U.S. patent 6,703,924 to Tecu et al. (Tecu). Applicant respectfully traverses the rejections. Regarding amended claims 1 and 7, which call for a plurality of tactile elements that correspond to at least a fraction of a pixel, no mention of a fraction of a pixel is found in Tecu. Tecu teaches that "[e]ach of the plurality of output elements may correspond to a single pixel on the computer screen although, froma practical standpoint, it is preferable that each of the elements corresponds to a number of pixels grouped within a zone." (Tecu col. 2, lines 40-44) Furthermore, amended claims 1 and 7 have each been amended to further recite, *inter alia*, that the tactile user interface device further comprises a flexible membrane disposed on the plurality of tactile elements. This further limitation of a flexible membrane disposed on the plurality of tactile elements is also not found in Tecu. Tecu's disclosure of a tactile display offers no teaching or suggestion of a flexible membrane to cover the display. Accordingly, Tecu does not anticipate this invention.

Claims 14 and 15 stand rejected under 35 U.S.C. 102(e) as being anticipated by U.S. patent 6,693,516 to Hayward (Hayward). As claim 15 has been canceled, the rejection against claim 15 is moot. Claim 14 has been amended to include the further limitations of disposing a flexible membrane on the plurality of tactile elements and disposing on the flexible membrane a plurality of microelectromechanical devices that each correspond to one of the tactile elements. Hayward discloses an "elastomeric protective skin or cover" for protecting skin-contacting rods. (Hayward col. 5, line 67) Hayward fails to teach a plurality of microelectromechanical devices that each correspond to one of the tactile elements. As this further limitation is not found in Hayward, Hayward does not anticipate the current invention.

35 USC § 103 Rejections

Claims 2-5 and 8-13 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Tecu in view of Hayward. Applicant respectfully traverses the rejection as improper because Tecu and Hayward fail to provide a *prima facie* case of obviousness and are not available for a 103 rejection because the references do not recite or suggest each and

every limitation of the amended claims and there is no teaching or motivation to combine Hayward and Tecu found in either source. Dependent claims incorporate all the limitations of the claims from which they depend. As shown above, amended claims 1 and 7 contain elements not found in either Tecu or Hayward. Therefore, amended claims 2-5 and 8-13, each a dependent of amended claim 1 or 7, incorporate those same elements that are lacking in Tecu and Hayward.

Regarding claim 3, the Office Action states, "Hayward teaches wherein said device that provides an electrical signal when said pressure from user's finger exceeds a set pressure threshold is a switch." (Office Action page 6, item 11) The section of Hayward referenced by the Office Action discloses a piezoelectric element that may operate in the d31 or d11 mode. A piezoelectric element operating in one of two modes does not constitute a switch. "Switch" is defined by Graf's *Modern Dictionary of Electronics* as "a mechanical component for opening or closing (interrupting or completing) one or more electrical circuits." See attached. A piezoelectric element may be a component of a switch, but by itself does not constitute a switch. To further clarify, Applicant has amended claim 3 to recite a *mechanical* switch, as supported by page 4, line 22 of the specification.

Regarding claim 5, the Office Action maintains that the combination of Tecu and Hayward "teaches wherein said tactile feedback information includes vibrations (pixel zone 22.13(dark) corresponds to the tactile output elements 16.4 shown in its lowest position, while pixel zone 22.4 (bright) corresponds to the tactile output elements 16.4 shown in its highest position, see Tecu, col. 3, lines 26-30; vibrotactile sensations, see Hayward, col. 5, lines 40-45, and heat expansion actuators, see Hayward, col. 3, line 5)".

However, the use of heat expansion actuators to physically displace rods, as taught by Hayward, does not translate into temperature feedback information. Nothing in Hayward teaches or suggests that feedback in the form of changes in temperature may be provided to a user by heat expansion actuators. The heat expansion actuators of Hayward are employed as motive forces for mechanically displacing skin contactors to effect a lateral displacement of the skin. Of the forms of feedback recited in claim 5, namely elevation, vibrations, textures, and temperatures, the references do not disclose texture or temperature. The Office Action has not established a *prima facie* case of obviousness

because the temperature and texture feedback information of claim 5 is not found or suggested in Hayward and Tecu.

The Examiner states that "it would have been obvious to a person of ordinary skill in the art at the time the invention was made to implement the Z(t) exceeds the event signaling threshold from the user's finger as taught by Hayward in the pressure sensors of Tecu in order to achieve the benefit of improve structural strength in a miniature device, and the ability to take advantage of strain-based actuating effects such as piezoelectric." (Office Action pg. 6, 1st ¶ citations omitted) However, such a combination is not obvious because it would render Tecu useless for its intended purpose. Tecu allows a tactile display to present a "3-dimensional pattern or contour that a user can sense by touch...." (Tecu col. 4, lines 17-18) The use of strain-based actuating as suggested by the examiner would not allow for a 3-dimensional pattern to be displayed, because Hayward's strain-based actuators work in a 2-dimensional plane. Furthermore, Tecu's device allows Braille characters to be displayed to a user. (Tecu col. 5, line 28) Combining Hayward's strain-based actuators (with their inability to create 3-dimensional patterns) with Tecu as suggested by the Examiner would destroy the ability of Tecu's device to present Braille characters. Furthermore, disposing a flexible membrane on the plurality of tactile elements of Tecu is not obvious because doing so would inhibit a user from discerning individual Braille characters. Therefore, the 35 USC 103 rejection of claims 2-5 and 8-13 is requested to be withdrawn.

Claim 6 stands rejected under 35 U.S.C. 103(a) as being unpatentable over Tecu in view of U.S. patent 6,354,839 to Schmidt et al. (Schmidt). The Examiner maintains "it would have been obvious to a person of ordinary skill in the art at the time the invention was made to implement the microelectomechanical device operating to open and close as taught by Schmidt in the tactile user interface device of Tecu in order to achieve the benefit of provide a refreshable display that allows a user to access links or subdirectories without removing their hands from the Braille display surface, quickly and easily assembled or repaired, eliminate any interference and prevent damage to underlying display hardware." (Office Action page 8, 2nd ¶ (citations omitted))

Applicant respectfully traverses the rejection as improper because Tecu and Schmidt are not available for a 103 rejection because the references do not recite or

suggest each and every limitation of the amended claims 1 and 6. Claim 6 depends from and incorporates all the limitations of claim 1. As described above, amended claim 1 recites elements not disclosed or suggested in Tecu such as the tactile elements corresponding to a fraction of a pixel, and a flexible membrane disposed on the plurality of tactile elements. Accordingly, the 35 USC 103 rejection of claim 6 is requested to be withdrawn.

Conclusion

Based on the above, claims 1-14 and 16-18 are in condition for allowance.

Respectfully Submitted,

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sweep linearity — The maximum displacement error of the independent variable between specified points on the display area in an oscilloscope.

sweep lockout — A means for preventing multiple sweeps when operating an oscilloscope in a single-sweep mode.

sweep magnifier — Also called sweep expander. A circuit or control for expanding part of the sweep display of an oscilloscope.

sweep oscillator — An oscillator used to develop a sawtooth voltage that can be amplified to deflect the electron beam of a cathode-ray tube. *See also* sweep generator.

sweep switching — The alternate display of two or more time bases or other sweeps using a single-beam CRT. Comparable to dual- or multiple-trace operation of a deflection amplifier.

sweep test — Pertaining to cable, checking the frequency response by generating an rf voltage whose frequency is varied back and forth through a given frequency range at a rapid constant rate while observing the results on an oscilloscope.

sweep-through — A jamming transmitter that sweeps through a radio-frequency band and jams each frequency briefly, producing a sound like that of an aircraft engine.

sweep voltage — The voltage used for deflecting an electron beam. It may be applied to either the magnetic deflecting coils or the electrostatic plates.

swell manual — Also called solo manual. In an organ, the upper manual normally used to play the melody. *See also* manual, 2.

swept resistance — The portion of the total resistance of a potentiometric transducer over which the slider travels when the device is operated through its total range.

swim — The phenomenon in which the constructs on a CRT screen appear to move about their normal position. It can be observed when the refresh rate is slow and is not some multiple or submultiple of line frequency. In some cases, swim is a result of instability in the digital-to-analog converters in the display controller

swimming — Lateral shifting of a thick-film conductor pattern on molten glass crossover patterns.

swing — 1. The variation in frequency or amplitude of an electrical quantity. 2. The total variation of voltage, current, or frequency. 3. The arc traversed by the needle of a meter.

swingback permeability — *See* reversible permeability.

swinger — 1. A swinging short. 2. *See* swing short.

swinging — 1. Momentary variations in frequency of a received wave. 2. Existing only for short periods.

swinging arm — A type of mounting and feed used to move the cutting head at a uniform rate across the recording disc in some recorders. All phonograph pickups are of the swinging-arm type.

swinging choke — 1. A filter inductor designed with an air gap in its magnetic circuit so its inductance decreases as the current through it increases. When used in a power-supply filter, a swinging choke can maintain approximately critical inductance over wide variation in load current 2. An audio-frequency choke whose core is operated saturated with flux. It is used at the input of a power-supply filter for improved voltage regulation. Its inductance is at a maximum for small currents, and charges (swings) to a minimum for large currents.

swing short — Also called swinger. A come-and-go (intermittent) short produced by a pair of wires swinging together in the wind.

swiss-cheese packaging — Also called imitation 2D. A high-density packaging technique in which passive and active components are inserted into holes punched in printed circuit board substrates and attached by soldering or thermocompression bonding or by means of conductive epoxy adhesive.

switch — 1. A mechanical or electrical device that completes or breaks the path of the current or sends it over a different path. 2. In a computer, a device or programming technique by means of which selections are made. 3. A device that connects, disconnects, or transfers one or more circuits and is not designated as a controller, relay, or control valve. The term is also applied to the functions performed by switches. 4. A mechanical component for opening or closing (interrupting or completing) one or more electrical circuits. In electronics, as opposed to the electrical industry, switches tend to be low-voltage, low-current units scaled to the size of the equipment in which they function. Switches suitable for opening and closing 120- and 240-volt ac line current and various dc and signal-level voltages under 100 volts dc predominate. 5. A mechanical or electronic device designed for conveniently interrupting, completing, or changing connections in electrical circuits whenever desired or necessary. Mechanical types may control more than one circuit by incorporating multiple-contact elements that are controlled by the same actuator. Electronic switches ordinarily control only a single electrical circuit.

switchboard — 1. A manually operated apparatus at a telephone exchange. The various circuits from subscribers and other exchanges terminate here, so that operators can establish communications between two subscribers on the same exchange or on different exchanges. 2. A single large panel or an assembly of panels on which are mounted the switches, circuit breakers, meters, fuses, and terminals essential to the operation of electrical equipment. 3. An attended console where telephone subscribers' lines appear for answering and calling. An operator interconnects lines and trunks and supervises the connections.

switch detector — A detector that extracts information from the input waveform only at instants determined by a selector pulse.

switched capacitor — A technique commonly used in analog signal processing to create filtering and signal conditioning circuits.

switched line — Also called dial-up line. A communications link for which the physical path may vary with each usage, such as the public telephone network.

switched network — Also called public switched network and switched message network. 1. The network by which switched telephone service is provided to the public. 2. A multipoint network with circuit switching capabilities. The telephone network is a switched network, as are Telex and TWX.

switcher — 1. A catchall term for a power source that employs switching techniques to achieve higher-efficiency regulation. Can include line switchers and conventional transformer/rectifier ac-operated power sources employing switching regulator techniques. 2. A device that allows the pictures from a number of cameras to be viewed on one monitor. 3. *See* switching power supply.

switch-fader — A control that permits each of two or more cameras to be selectively fed into the distribution system. The fader permits gradual transition from one camera to another.

switch gear — A general term covering switching, interrupting, control, metering, protective, and regulating devices; also assemblies of these devices and associated interconnections, accessories, and supporting structures,

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